Code: **QO521**

Name: **Química Orgânica II**

Name in English: **Organic Chemistry II**

Name in Spanish: **Química Orgánica II**

Subject type: **Weekly**

Approval Type: **Grade and Attendance**

Characteristic: **Regular**

Frequency: **75%**

Period Type / Offering period: **Semester / All periods**

Requires Final Exam: **Yes**

Vectors

T	L	P	O	PE	OE	SL	WEEKS	CREDITS
6	**-**	**-**	**-**	**-**	**-**	**6**	**15**	**6**

Occurrence on curriculum: **05, 50, 56**

Pre requirement: **QO321**

Summary: **Aldehydes and ketones, carboxylic acids and their derivatives, conjugation in allylic systems, dienes and polyenes, unsaturated carbonyl compounds, and Diels-Alder reactions. Benzene and aromatic systems, electrophilic and nucleophilic aromatic substitution, aryl halides, phenols, and aryl amines and other nitrogen-containing compounds. The content emphasizes the relationship between molecular structure and reactivity, with a focus on reaction mechanisms, stereochemistry, and practical applications.**

Program:

1) **Aldehydes and Ketones:**
- Structure and properties, occurrence and uses, group carbonila's theoretical understanding, methods of preparation, nucleophilic addition reactions, influence of substituents on reactivity, stereochemical aspects, and reduction and oxidation methods.

2) **α-Carbonyl Position Reactions and Unsaturated Carbonyl Compounds:**
- Acidity of the α-carbonyl position, theoretical background, nucleophilic addition versus enolate formation, racemization, α-halogenation, aldol reactions, and pre-formed enolates.

3) **Carboxylic Acids:**
- Structure, properties, occurrence, uses, acidity, effects on acidity, salt and derivative formation, esterification, and group reduction.

4) **Carboxylic Acid Derivatives:**
- Structure and properties, occurrence and uses, theoretical background, nucleophilic addition mechanism, hydrolysis, derivative interconversion, acidity, enolate formation, alkylation, aldol reactions, and organometallic addition.

5) **Conjugation, Allylic Systems, Dienes, Polyenes, and Diels-Alder Reactions:**
- Allylic system, theoretical understanding, dienes, structure and reactivity, unsaturated carbonyl compounds, conjugated addition, and Diels-Alder reaction.

6) **Benzene and Aromaticity:**
- Historical aspects, structure, nomenclature, properties, resonance energy, theoretical background, Huckel's rule, side-chain reactions, and Birch reduction.

7) **Electrophilic Aromatic Substitution Reactions:**
- Halogenation, nitration, sulfonation, Friedel-Crafts alkylation and acylation, orientation effects, and multiple substituent effects.

8) **Aryl Halides and Nucleophilic Aromatic Substitution. Phenols:**
- Mechanisms of nucleophilic aromatic substitution, preparation of phenols, and substitution nuances.

9) **Amines:**

- Structure, properties, sources, uses, basicity, salt formation, imines and enamines, preparation methods, reductive amination, and rearrangement reactions.

10) **Other Nitrogen-Containing Functional Groups:**

- Nitro compounds, isocyanates, carbamates, ureas, diazo compounds, azo compounds, their structures, physical properties, practical applications, reactivity, and reactions.

Basic Bibliography

1) CLAYDEN, GREEVES, WARREN, Organic Chemistry, 2nd Ed., Oxford Press, 2012.
2) SOLOMONS, FRYHLE, SNYDER, Organic Chemistry, 12th Ed., John Wiley, NY, 2016.
3) McMURRY, J.E., Organic Chemistry, 9th Ed., Cengage Learning, 2016.

Supplementary Bibliography

1) STREITWIESER, HEATHCOCK, KOSOWER, Introduction to Organic Chemistry, 4th Ed., McMillan Publishers, NY, 1992.
2) KLEIN, D. R., Organic Chemistry, 2nd Ed., Wiley-VCH, 2013.
3) CAREY, F. A., Organic Chemistry, 7th Ed., McGraw Hill Inc., NY, 2008.
4) ANSLYN, DOUGHERTY, Modern Physical Organic Chemistry, University Science Books, 2007.
5) COSTA, PILLI, PINHEIRO, BAKUZIS, The Chemistry of Carbonyl Compounds and Derivatives, 1st Ed., The Royal Society of Chemistry, London, 2022.